

Effects of autologous gingiva-derived cells with myogenic potential on regeneration of skeletal muscle

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Abstract

In our recent studies we found for the first time the ability of human multipotent mesenchymal stromal cells (MSCs) derived from alveolar gingiva (alveolar mucosa) to differentiate into myogenic direction. The aim of the present study was to evaluate the effects of autologous gingiva-derived MSCs with myogenic potential on the regeneration of muscular tissue after mechanical damage. The study was conducted on 11 male rabbits. Biopsy of alveolar gingiva was performed at each animal before experiment for autologous MSCs obtainment. Cultures of MSCs were induced in vitro into myogenic direction. To model the damage, the medial heads of the gastrocnemius muscles were intersected on both pelvic limbs of the rabbit. Injection of autologous MSCs was performed on the seventh day after injury into the damaged muscle of one of the extremities, while equal volume of saline (control) was injected into the muscle of the contralateral limb. The animals were sacrificed on 0, 21, and 35 days after the administration of cells. MSCs transplantation led to significant reduction of the area of muscle damage. Immunohistochemical analysis revealed earlier increase in the proportion of MyoD- and myogenin-positive cells, as well as decrease in the expression of Ki-67 in damaged tissue, in experimental group compared to the control. Autologous cells did not significantly affect the composition of muscle fibers. Significant decrease in the proportion of fibrous tissue was also observed in the experimental group. The results indicate the effectiveness of autologous alveolar gingiva-derived MSCs for treatment of mechanical damage of muscle tissue. Local administration of cells accelerated reparative regeneration and prevented fibrosis.

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Keywords

Alveolar gingiva, Experimental model of skeletal muscle damage, Multipotent mesenchymal stromal cells, Myoblasts, Myogenic differentiation

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